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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/690,507

10/23/2003

Ji Yong Park

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EXAMINER

SONG, MATTHEW J

ART UNIT

PAPER NUMBER

1722

MAIL DATE

DELIVERY MODE

06/14/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/690,507	Applicant(s) PARK ET AL.	
	Examiner Matthew J. Song	Art Unit 1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-15 is/are pending in the application.
- 4a) Of the above claim(s) 4,5,11,12 and 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 6-10 and 13-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/29/2007 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1, 3, 6-10 and 13-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 6 recite the limitation, "transversely moving the mask relative to the substrate by a translation distance." See also claims 13. The specification does not appear to support this claimed limitation. The specification merely states that: "amorphous silicon and crystalline silicon are melted by moving a mask through stages of movement", note paragraph

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[0024] of the original specification . This statement does not support the recited claimed limitations. Nowhere in the specification is there support for this claimed limitation, expressly, implicitly or inherently.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3 and 13-14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jung (US 6,825,493).

Jung discloses a method of forming an amorphous silicon layer on a substrate and crystallizing the amorphous layer to form polycrystalline silicon (col 14, ln 35-67). Jung also discloses the crystallization method comprises irradiating the amorphous silicon layer **200** with a laser beam **34** that passes through a mask **130** (col 9, ln 1-67 and Fig 6a). The mask is then moved along the lateral grain growth of the grains by a distances of about 0.7 micrometers; therefore each of the light transmitting portions of the mask exposes a portion of the first grain region, middle section, the second grain regain and an new amorphous silicon regions are additionally exposed resulting in larger grains (col 9, ln 45-67), this reads on applicant's the laser beam is overlappingly irradiated at an overlapping region on the substrate where amorphous

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silicon and a part of the already crystallized polysilicon are exposed so as to increase an average width of the polycrystalline silicon grains. Jung also teaches the width of the overlap corresponds to movement of the mask, which is varied between 0.7 micrometers and 1.7 micrometers (col 9, ln 45-67; col 10, ln 25-45; and col 14, ln 1-25). Jung teaches silicon grains have a width of 12 micrometers (col 10, ln 1-15) and have a grain width of 1.7 micrometers when the overlap is decreased (col 10, ln 1-65).

Referring to the limitation, “wherein the average width of the polycrystalline silicon grains is varied between approximately 0.2 and 0.6 μm and is decreased when the width of the overlapping region on which the laser beam is overlapping irradiated is decreased”, Jung teaches the width of the overlap corresponds to movement of the mask, which is varied between 0.7 micrometers and 1.7 micrometers (col 9, ln 45-67; col 10, ln 25-45; and col 14, ln 1-25). Also, the width of the grains is also between 0.2 and 0.6 μm based Fig 3C which shows the grains and has a 0.7 μm reference scale and the width between the grains. Furthermore, Jung teaches decreasing the width of the overlap, thus the average width of the grains will decrease because applicant’s teach decreasing the width by decreasing the overlap, note paragraph [0028] of the original specification; therefore a similar grain width is inherent because Jung discloses an overlap within the range taught by applicant to obtain the claimed grain width. While Jung does disclose a grain width within the claimed range in Fig 3C, Jung does not state in the specification what the width is but rather the width can be determined from the figure. In the alternative that Jung does not teach the claimed width, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Jung by varying the overlap to obtain the claimed width.

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Referring to claim 3, Jung teaches sequential lateral solidification crystallization (Abstract).

Referring to claim 13-14, Jung discloses irradiating an amorphous silicon film using a laser beam through a mask with a light transmission region and a light non-transmission region; transversely moving the mask; overlappingly irradiating the already formed crystalline silicon and has a width of 0.7 μm to 1.7 μm (col 9, ln 1 to col 10, ln 65).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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7. Claims 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jung (US 6,825,493) as applied to claims 1-3 and 13-14 above, and further in view of Yang (US 2002/0197759 A1).

Jung discloses all of the limitations of claim 6, as discussed previously, except Jung does not teach the laser transmission region is wider than the laser non-transmission region by more than 1 μm .

In a method of sequential laser solidification (SLS) for crystallization of amorphous silicon, note entire reference, Yang teaches the mask moves transversely by no more than the wide of the shaped patterns as a laser performs SLS crystallization. (Abstract). Yang also teaches a mask includes a plurality of slits A that pass a laser beam and a light absorptive areas B that absorb the laser beam and the wide of each slit A defines the grain size of the crystallized silicon ([0010]). Yang also teaches using a pattern of 2 μm ([0072]) and grains of 1-1.5 μm ([0076]). Yang also teaches an overlapped regions ([0040]). Yang also teaches more rapid crystallization can be achieved using masks having different slit patterns and laser beam scanning ([0035]). Yang also teaches a pattern where the slit patterns are wider than an interval "O". (Fig 6 and [0035]).

Yang teaches using different patterns and a pattern where the laser transmission region is larger than a non-transmission regions. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Jung by having a transmission region that is wider than a non-transmission region by more an 1 μm by optimizing the mask size because the size of the slit is a result effective and different patterns are used to achieve more rapid crystallization, as taught by Yang.

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Referring to claim 7, the combination of Jung and Yang teaches stripes ('493 Fig 5 and '759 Fig 6).

Referring to claims 8-10, the limitations are the same as claims 1-3 which was discussed previously.

Response to Arguments

8. Applicant's arguments with respect to claims 1, 3, and 13-14 have been considered but are moot in view of the new ground(s) of rejection.

9. Applicant's arguments filed 3/29/2007 have been fully considered but they are not persuasive.

Applicant's argument that Yang teaches the use of a completely different mask is noted but is not found persuasive. The Examiner admits that Yang teaches novel mask in Fig 8, as alleged by applicant. However, Yang also has a teaches mask patterns where the slits are larger than the interval between slits (Fig 6 and [0035]). Yang also teaches more rapid crystallization can be achieved using masks having different slits patterns ([0035]). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Jung by optimizing the slit patterns such that the laser transmission region is wider than the non transmission region by 1 μm to increase crystallization. A change in the shape of the mask would have been obvious to one of ordinary skill in the art because the pattern on the mask is a result effective variable.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1722

MJS
June 8, 2007


ROBERT KUNEMUND
PRIMARY PATENT EXAMINER
A.U. 117